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Patent Claims

5 1. An arrangement (1) for supplying voltage to a number of loads (2, 2'), in particular in a vehicle (36), having a vehicle power supply system (6) which has at least two energy stores (4a, 4b), a first energy store (4a) of which is connected in a starter circuit  
10 element (6a) to a starter (8) for starting an engine, and a second energy store (4b) of which is connected in a load circuit element (6b) to the load (2, 2'), characterized in that  
15 a controller (16) is provided, which has a coupling element (12), via which the starter circuit element (6a) can be connected to the load circuit element (6b), additional coupling elements (14), via each of which in  
20 each case one load (2') which is classified as being safety-relevant can be connected to the starter circuit element (6a), and a measurement means (22) for detection of data, from which a data processing unit (18) in the controller  
25 (16) can determine the state of the energy store (4a, 4b) for each circuit element (6a, 6b), as well as data (32, 34) which supplies information about a current (Is) to a safety-relevant load (2') as well as a voltage (Uc) which is dropped across a safety-relevant  
30 load (2') so that the data processing unit (18) can continuously monitor the state of the energy stores (4a, 4b) for the circuit elements (6a, 6b) as well as the safety-relevant loads (2') and the paths to the safety-relevant loads (2') and can control switching of  
35 the coupling element (12) and/or of the additional coupling elements (14) in response to this state.

2. The arrangement as claimed in claim 1,

characterized

in that

the data processing unit (18) in the controller (16) uses the voltage of the first energy store (4a), which  
5 is applied to respective safety-relevant loads (2') by associated disconnected coupling elements (14), for current-free monitoring and determination of the availability of supply to the respective safety-relevant load (2') independently of the state of the  
10 load circuit element (6b) and the controller drives a coupling element (12'') or a safety device in addition to the coupling element (12'') corresponding to the determined availability of the supply.

15 3. The arrangement as claimed in claim 1 or 2, characterized

in that

the controller (16)

- in a normal mode, when it is determined that the  
20 load circuit element (6b) is fully available, controls the switching of the coupling element (12, 12'') such that the safety-relevant load (2') is supplied only by the load circuit element (6b),  
in a second operating mode, when it is determined that  
25 the load circuit element (6b) is not fully available, controls the switching of the coupling element (12, 12'') such that the load circuit element (6b) is supported via the coupling element (12'') by the first energy store (4a) and the starter circuit element (6a),  
30 in order to ensure the entire supply, and  
in a third operating mode, when it is determined that the load circuit element (6b) has failed completely, controls the switching of the coupling element (12'') such that the coupling element (12'') is disconnected or  
35 a safety device in addition to the coupling element (12'') achieves disconnection from the starter circuit element (6a) and the load circuit element (6b), and the safety-relevant load (2') is supplied only via the

starter circuit element (6a) from the first energy source (4a).

4. The arrangement as claimed in one of claims 1 to  
5 3,  
characterized  
in that  
the data processing unit can determine an amount of  
charge which is drawn by each safety-relevant load (2')  
10 from the data (32, 34), can control the coupling  
element (12) and/or the additional coupling elements  
(14) as a function of the state of the energy store  
(4a, 4b) and/or of the ranking of the relevant safety-  
relevant load (2'), and/or can connect and/or  
15 disconnect the safety-relevant load (2').

5. The arrangement as claimed in one of claims 1 to  
4,  
characterized  
20 in that  
when the data processing unit (18) determines that the  
second energy store (4b) has fallen below a capacity  
limit or has failed, the safety-relevant load (2') is  
connected to the first energy store (4a) via the  
25 coupling element (12).

6. The arrangement as claimed in claim 5,  
characterized  
in that  
30 when the data processing unit (18) determines that a  
capacity limit of the first energy store (4a) has also  
been undershot, the respective additional coupling  
element (14) for the safety-relevant loads (2') is  
controlled such that individual safety-relevant loads  
35 (2') are disconnected on the basis of their ranking.

7. The arrangement as claimed in one of claims 1 to  
6,

characterized

in that

the data processing unit (18) determines from the data  
supplied to it the amount of energy which is required  
5 for the respective safety-relevant load (2') and  
ensures that only this amount of energy is supplied to  
the safety-relevant load (2').

8. The arrangement as claimed in one of claims 1 to  
10 7,

characterized

in that

the safety-relevant loads (2') are coupled to the  
starter circuit element (6a) entirely or largely  
15 without any quiescent current by means of the  
additional coupling element (14).

9. The arrangement as claimed in one of claims 1 to  
20 8,

characterized

in that

the controller (16) switches the loads (2) and/or the  
safety-relevant loads (2') as a function of the  
detected data.

25

10. The arrangement as claimed in one of claims 1 to  
9,

characterized

in that

30 the additional coupling element (14) comprises at least  
one field-effect transistor (24) and a diode (26).

11. The arrangement as claimed in one of claims 1 to  
35 10,

characterized

in that

the coupling element (12) is in the form of a switch  
(12'') or a DC/DC voltage converter (12').

12. The arrangement as claimed in one of claims 1 to 11, characterized

5 in that

the energy stores (4a, 4b) are of such a size that they have the amount of charge required for cold starting of an internal combustion engine only when they are interconnected.